

Nearshore Berm Discussion

Environmental Impacts

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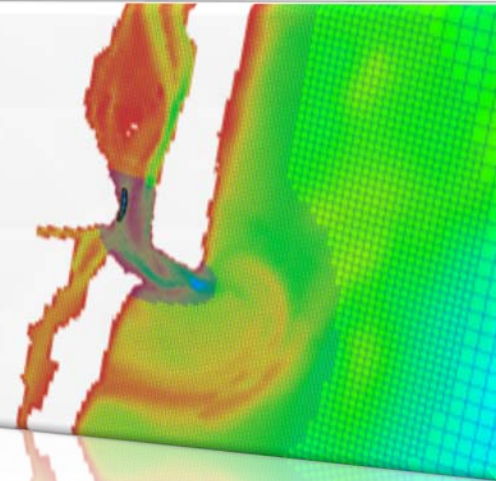
Nearshore Berm Workshop
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Definitions

- **Fines** – very fine sand passing 200 sieve, silts and clays
- **Nephelometric Turbidity Units (NTU)** – Measures the Light that is Scattered at 90° from the Light Source
- **Total Suspended Solids (TSS)** - Measure of the Total Mass of Particles in a Sample
- **Turbidity** – Optical property that causes light to be scattered and absorbed rather than transmitted in straight lines through the sample*



**Standard Methods for Examination of Water and Wastewater*

Definitions

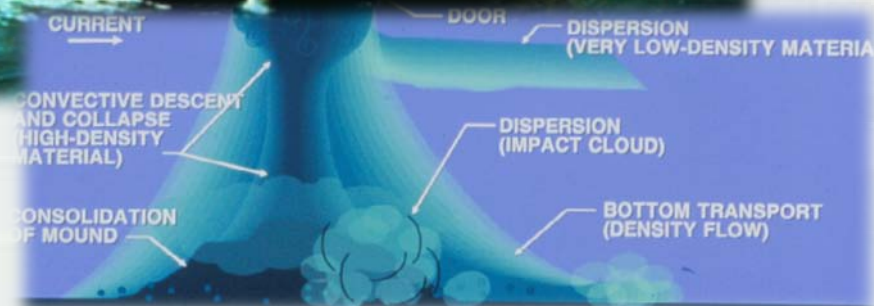
- **Traditional Placement** – placement of material to “build a beach”
- **Submerged Aquatic Vegetation** - any combination of seagrasses, oligohaline grasses, attached macroalgae and drift algae that covers 10 to 100 percent of a substrate*



* <http://myfwc.com>

Definition of Placement Operations

Hopper or Split Barge Placement



Hydraulic Placement



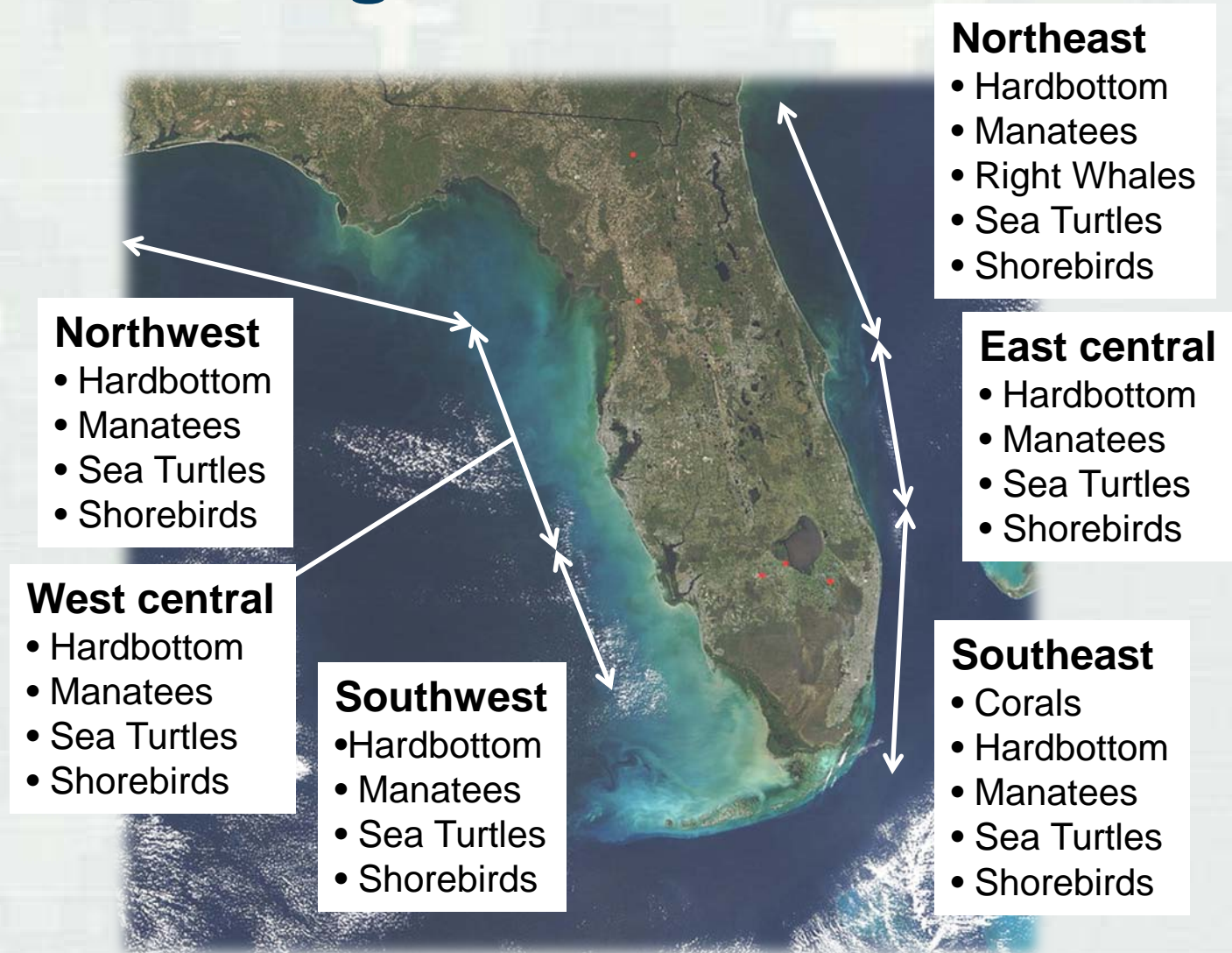
- Methodologies have very different dynamics

Topics to Discuss - Outline

- Resources of concern
- Potential environmental impacts
- Modeling & field measurements
- Reduced impacts vs. traditional placement
- Drawbacks vs. traditional placement
- Research to further
“Engineering with Nature”



Regional Resources



Potential Environmental Impacts

Corals

- Concern about sedimentation impacting corals.
- Mitigated by NMFS requirement to that placement occur 400 ft from *Acropora* spp. (Boynton Beach and south).

Shorebirds

- Nearshore placement may be preferable to beach placement:
 - ▶ May create emergent or ephemeral shoals utilized as foraging habitat; and
 - ▶ No direct impacts to beaches (nesting, foraging, roosting).



Potential Environmental Impacts

Nearshore Hardbottom

- Support diverse assemblages of algae, invertebrates, fishes, and sea turtles.
- Impacts can occur from direct burial during placement, or from movement of sand onto hardbottom habitats.
- Resource surveys required for SPPs.

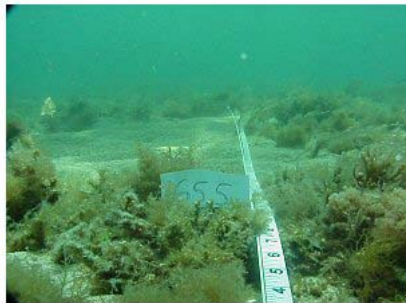


Photo Credit: Nova Southeastern University

Sea Turtles

- Nesting turtles may be precluded from reaching nesting beaches, resulting in false crawls.
- Hatchling turtles may be prevented from reaching the open ocean.
- More of an impact on the Gulf Coast due to shallow nearshore waters.
- USFWS typically requires that no sand be placed higher than MLLW.



Potential Environmental Impacts

Cultural Resources

- Cultural resources in the nearshore area must be buffered to prevent impacts from equipment or dredged materials.
 - ▶ Ponce Inlet
 - ▶ Egmont Key



Photo Credit: Kat McConnell, USACE



Potential Environmental Impacts

Turbidity

- Light attenuation – reduced photic depth
- Gill abrasion
- Settlement of suspended solids resulting in habitat coverage



Potential Environmental Impacts

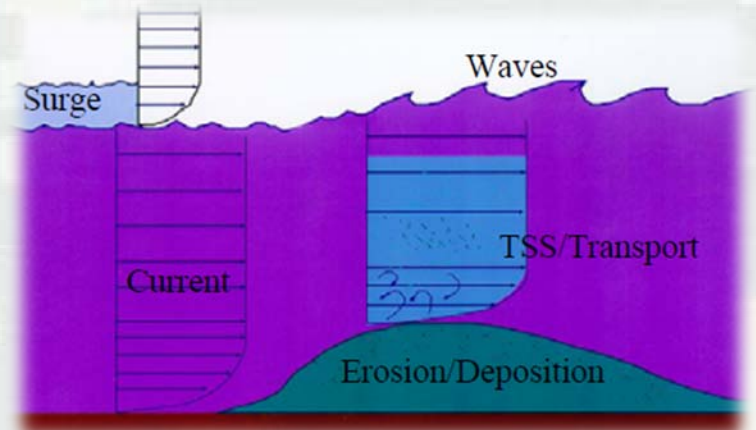
Secondary Impacts

- **Turbidity**
 - Reduced biological productivity
- **Settlement of suspended solids**
 - Reduced biological productivity
 - Larger re-suspendable bed loads



Modeling

- **Sediment transport models**
 - Based on our understanding of physical processes
 - Nearshore process are extremely complex
 - Site-Specific sediment data
 - Mixed sediments pushing the envelope of transport model capabilities
 - Based on process research/data collection
 - Must be aware of model limitations



Field Measurements

- **Process Measurements**

- Hydrodynamic conditions (tides, currents, waves, salinity,...)
- Sediment settling (disposition/sedimentation)
- Water column concentrations
- Sediment bed composition
- Morphologic evolution
- Monitor dredging process



Reduced Impacts vs. Traditional Placement

- **Lower cost**

- Construction – no beach grading equipment
- Maintenance – less escarpment, tilling

- **Reduced beach traditional use impacts**

- Sunbathing
- Water sports

- **Reduced environmental Impacts**

- Turtle nest relocations avoided
- Cemeration potential eliminated
- Beach Munsell Color change reduced as sediment is spread out and bleaches more naturally
- Shorebird impacts eliminated



Drawbacks vs. Traditional Placement

- Material is not immediately visible to public
- Remediation for unacceptable material far more difficult
- If parameters imposed on nearshore placement are overly restrictive this placement method could become more expensive than traditional beach placement



Research to Further “Engineering with Nature”

- **Modeling development efforts**

- Improve mixed sediment transport algorithms
- Improve site-specific parameterization methods
- Improve far field modeling of fines

- **Field data collection efforts**

- Long term background turbidity/sedimentation data collection
- Site specific correlation for NTU to SSC
- Near and far field dispersion and settlement of fines
- Threshold of turbidity, SSC, and sedimentation required for resource impacts



Thank You!



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